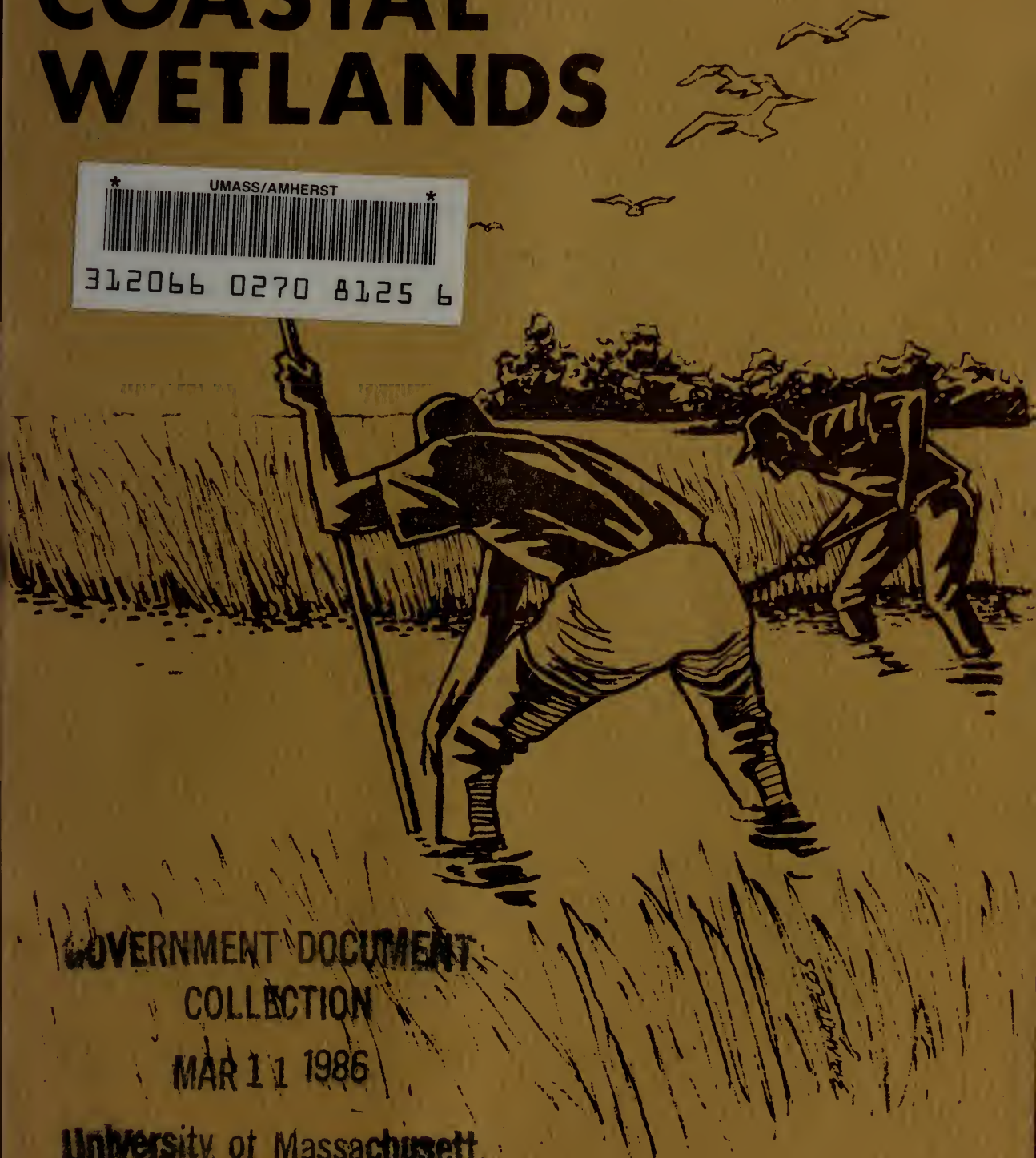
THE VALUE OF MASSACHUSETTS' COASTAL WETLANDS



THE VALUE OF THE COASTAL WETLANDS OF MASSACHUSETTS

Compiled for hearings under the
provisions of Chapter 130, Section 105
of the Massachusetts General Laws

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I INTRODUCTION

Under the provisions of Chapter 130, Section 105 of the Massachusetts General Laws, the Commissioner of Natural Resources, with the approval of the Board of Natural Resources, may for the purpose of promoting public health, welfare, and safety, and protecting public and private property, wildlife and marine fisheries, initiate action to restrict or prohibit dredging, filling, removing or otherwise altering or polluting coastal wetlands.

Coastal wetlands can be divided into four distinct categories: salt marsh, tidal flats, contiguous uplands (barrier beaches), and contiguous freshwater marsh. Each of these land forms has at least one natural function that would be adversely affected by any large-scale physical alteration of the land form involved. The evaluation of these functions is reflected in the allowed uses that are spelled out in the proposed order of restriction, and this evaluation forms the basis for the inclusion or deletion of a specific area from the proposed zone of restriction.

1] Salt marshes provide habitats for many types of plant and animal life and serve as vital areas for the spawning, feeding, and nursery grounds for many species of marine life. In addition, these areas act as a buffer, storing the tidal waters along with the aperiodic storm waters and dispersing much of the energy before it can reach the areas of human habitation.

2] Tidal flats, both in the intertidal and subtidal zones, act as a buffer also by reducing the impact of the wave action before it reaches the shore. The inshore tidal flats also act as breeding and development grounds for various species of shellfish.

3] Contiguous uplands, barrier beaches specifically, form the primary line of defense against coastal storms, minimizing any wave damage to the marsh/estuarine system.

4] Contiguous freshwater marshes act as a buffer between the human activities on the upland area and the life in the estuarine ecosystem which is a unique subsystem unto itself. These areas also store and diffuse floodwaters, whether caused by terrestrial runoff or by coastal storms.

II THE LONG-RANGE COST OF DEVELOPING WETLANDS

The development of wetlands is marginally feasible at best! The initial cost of development or site preparation, when combined with the long-range cost of maintenance and protection that these areas usually require, raises the cost beyond a reasonable level. Both types of marsh must be drastically altered before any type of permanent structure may be located thereon. The temptation to develop these areas will exist though, for the initial price of the wetlands is low compared to the adjacent upland and the potential for a quick return is high.

The extensive alteration mentioned previously would include large-scale filling and dredging operations that will result in a number of liabilities that will often outweigh the addition to the tax base of the community that the development would add. Some of these liabilities are:

1] Aperiodic flooding in these areas will occur as a result of a set of conditions including the superposition of abnormally high tides, storm surge, seasonal storms, and hurricanes and will cause a high level of erosion of the exposed faces of land. Eventually it will be necessary to install protective structures to alleviate this problem, but the structures themselves will often cause additional problems elsewhere. In addition, maintenance of roads and utility lines through areas that are subject to flooding is quite often a continuous procedure, especially during the fall and winter seasons.

2] Soil conditions in the marsh areas will necessitate the use of filled areas for any septic system and the attendant leaching fields. These systems are seldom capable of handling the volume and variety of today's sewage, especially when the land use is concentrated. The development of wetlands will hasten the time when a community must install a municipal sewer system, necessitating the expenditure of large sums of money for the treatment plant and the attendant collection lines and pumping stations. The time scale involved in the installation and expansion of this system will be reliant on the suitability of any land form to development along with the concentration of the development itself.

3] Groundwater serves as the water supply of most coastal communities and some problems involved in the proper utilization of this resource can be readily linked to sewage disposal. Private well systems are often plagued by saltwater intrusion and ineffective septic systems, especially in or adjacent to wetland areas. These problems will necessitate the extension of a municipal water supply system into areas previously supplied privately. Any municipal system such as those mentioned above will require the outlay of large sums of money, often before the community is realistically prepared to do so.

Environmental quality and long-range economic welfare go hand-in-hand in the coastal community, for it is the resources that attract visitors and potential homeowners to these areas. The degradation of any unique land form or the uneducated use of any ecologically valuable area will ultimately result in both the specific loss of the viability of the area and the ultimate decline of the community. The Commonwealth can institute wetland protection through legislative action, but it is up to the community to want to comply with these regulations and to work towards assuring the viability of the natural resources thereof.

In addition, federally subsidized insurance is available via the National Flood Insurance Program so that owners may insure their property from flood damage. This program stipulates, however, that local governments must adopt proper land-use planning and enforce control measures that will guide future development of land in flood-prone areas. In other words the federal and state authorities may offer incentives in this regard, but the communities must be willing to follow certain reasonable guidelines if they wish to take advantage of that which is available.

III MARINE FISHERIES EVALUATION

The purpose of the Division of Marine Fisheries is to conserve and manage the marine fishery resources of the Commonwealth, protect and enhance the marine environment, and promote, through research and development, the continuance and expansion of recreational and commercial fisheries.

The Division is vitally involved with the Coastal Wetlands Program because of the major contribution salt marshes and tidal flats make to the overall productivity of the estuarine ecosystem. Algae and vascular plants that grow in coastal wetlands contribute vast quantities of nutrients and organic materials to the broad base of the marine food chain. The wetlands themselves provide essential protective, spawning and nursery habitats for many important forage, sport, and commercial species of finfish, shellfish, and other marine organisms.

Over 150 species of finfish (nearly 70 percent of the most valuable Atlantic coast fisheries) are dependent on the estuary during some phase of their life cycle. Winter flounder and bluefish are just two examples of the many species that are estuarine dependent. Studies in Massachusetts and other states conclude that the winter flounder, the most important sport and commercial finfish species in Commonwealth waters,

utilizes coastal bays and harbors as spawning areas and the shallower waters of the tidal rivers and creeks as prime nursery areas. Although the bluefish spawns in deeper waters, when the larvae hatch they move shoreward to spend their first critical summer of life in the sheltered estuarine system.

Like the salt marshes, tidal flats play a vital role in the total productivity of estuaries. Soft-shell clams, quahogs, and bay scallops in substantial quantities are found in tidal and subtidal flats along the Massachusetts coastline. Although intensively exploited in many areas by recreational and commercial shellfishermen, the larvae of these shellfish species, distributed throughout the estuary by the ebb and flow of the tide, constantly repopulate the flats to provide self-sustaining populations of major economic value with little input by man. Tidal flats also provide important feeding grounds for many types of finfish and serve as a habitat for a wide variety of bottom-dwelling marine forms, including crabs, snails, marine worms, and algae.

There are areas that are contiguous to the salt marshes and tidal flats that play important roles as protective barriers and buffer zones, preventing physical and biological degradation of the estuarine environment. In many areas salt marshes are protected from the open ocean by barrier beaches. These beaches absorb and help to disperse the impact of wave energy, especially when the waves are driven by the coastal storms. Indiscriminate development of these areas will gravely alter the physical character of the beach, resulting in a serious erosion problem. Salt marshes previously protected by the barrier beaches would be destroyed and the overall ecology of the estuary would be irrevocably changed.

The primary value of tidal freshwater marshes to marine fisheries is that they act as buffer zones between developed upland and upstream areas and the estuary below. By preventing uncontrolled physical alteration and development of these fresh tidal marshes, potential industrial and domestic

sewage pollution can be effectively minimized. This would result in the prevention of bacterial and chemical degradation of the upstream water quality, thus preventing any adverse impact on the marine resources in the lower reaches of the estuary.

In summation, dangers to the estuarine environment include water pollution, along with the alteration and destruction of salt marshes, intertidal and subtidal flats. The filling and dredging of these areas could seriously reduce nutrient contributions that support the entire marine food chain, destroy essential finfish and shellfish habitats, and lower water quality. All of this would lead to the general decline of the estuarine productivity and to major economic losses in marine recreational and commercial fisheries.

The future of all coastal fisheries depends on the controlled development of the coastal area. Intelligent planning, with an input based on a knowledge of marine resource requirements and values, can effectively assure that man's needs for waste disposal, residential development, commercial and industrial sites, marinas, airports, highways, and recreational facilities will not lead to the total degradation of the marine environment.

IV FISH AND GAME EVALUATION

The Massachusetts Division of Fisheries and Game serves to protect, enhance, and otherwise manage the fish and wildlife resources of the Commonwealth for the greatest benefits to the public.

With respect to the Coastal Wetlands Act, the Division's interest is to work toward the protection of the wetlands as an ecosystem. An understanding of this concept requires some background information for those who look at the coastal wetlands simply as a piece of real estate.

The formation of most of our salt marshes began thousands of years ago when ocean levels were much lower. In New England, these marshes tended to develop behind sandbars and barrier beaches or in drowned areas formerly occupied by freshwater marshes and ponds.

Formation of a salt marsh begins when the tidal action of the sea deposits fine-grained sediments across bays and estuaries - forming a barrier beach. The shallow waters behind the barrier start to fill with silt. The protected flats that develop are then colonized by saltwater cordgrass. With the passing of time, peat builds up around the roots and the marsh stabilizes and expands.

It doesn't always take a thousand years for a marsh to develop, for a section of tidal flat may be isolated by a sandbar and develop into a small marsh within a few decades. However, the possibility of new marshes cannot be used as an excuse for the indiscriminate filling in of existing marshes.

As in every ecological system, no single subsystem can be isolated. The barrier beach, tidal flat, and salt marsh all must be interrelated in any evaluation. Furthermore, a salt marsh may be fed by freshwater streams that intermix with the tidal waters. All of these are important to a wide variety of wildlife.

The barrier beaches that are often essential to the formation and protection of salt marshes are also directly important to wildlife. Shore birds such as plovers and sandpipers flit along the beaches, keeping just out of reach of the waves. They feed on mole crabs and ghost shrimp and other invertebrates that inhabit the shoreline. Some species of birds, such as the piping plover and the sanderling, are restricted by their feeding habits almost exclusively to sandy beaches. Dunlins, ruddy turnstones, great black-backed gulls, scoter, brant, and others use the beaches as feeding and resting areas. At low tide, various types of wild animals may journey out from inland areas to hunt mussels, oysters, worms, and fish that have been trapped in pools left by the ebbing tide.

In terms of plant and animal life, the tidal flats, especially when surrounded by marsh, are the most important of all shoreline types. Subject to daily inundation, the flats are home for razor and soft-shelled clams, lug worms, ghost shrimp and other invertebrates. Eelgrass is often found on the perimeter of these areas and it is an important food for ducks and geese, especially brant.

Tidal flats are also of paramount importance as feeding areas. Plovers, sandpipers, and phalaropes use their long bills to probe for crustaceans and other invertebrates that live in the mud of the protected flats; and gulls find a wide variety of food left by the tide.

Northern-breeding black ducks, highly prized game birds that make Massachusetts one of their wintering grounds, derive much of their nourishment from the flats. When the tide goes out the ducks fly out to feed on blue mussels, soft-shelled clams, and marine worms.

Salt marshes, like other coastal wetlands, are easily characterized by vegetation types. Sloping upward from the sea, a typical salt marsh is divided into zones of differing vegetation. Along the seaward limit of the marsh are found the more salt tolerant tall marsh grasses - alterniflora type. These blend into the shorter grasses - patens type - as one moves toward the center of the marsh. These shorter grasses usually constitute the majority of the marsh area. Moving inland from and next to these salt marsh areas, as the water turns from salt to brackish to fresh, the vegetation types change also, reflecting the salinity of the water on which they rely.

Tidal creeks that interlace the marsh are densely populated with algae, sponges, snails, crabs and worms. Small fishes and shrimp also live in the creeks until mature enough to venture into the sea. The salt marsh acts as a nursery for mussels and oysters; and in the area of salt meadow hay and spike-grass nest such birds as seaside sparrows, long-billed marsh wrens, red-winged blackbirds, and American bitterns. Several im-

portant game birds also nest in the salt marsh, including the black duck, blue-winged teal, and clapper rail. One animal in particular, the muskrat, builds his mound-shaped house in the short marsh grasses, sharing the area with the fiddler crab and the diamondback terrapin.

The salt marsh is also important to those species that frequent it only as visitors. Raccoons hunt crustaceans here in the evening and deer like to graze on the lush marsh grass. Black-crowned night herons hunt pickerel frogs while marsh hawks catch meadow moles that build their runways through the drier reaches of the marsh.

Any evaluation of the importance of coastal wetlands for wildlife must include adjacent freshwater marshes. These areas increase the variety of food and cover available to coastal wildlife due to the difference in vegetative types from the salt marshes and other saline areas. Many species of waterfowl, shorebirds, heron, and mammals that nest or live in freshwater marshes will move to salt marshes and tidal flats to feed. Thus, in this type of coastal wetland, new forms of wildlife will also develop. Green frogs and bullfrogs replace pickerel frogs, and catbirds and northern yellowthroats supplant bitterns and rails.

The entire coastal ecosystem - barrier beaches, tidal flats, salt and freshwater marshes and the sea itself - all interact to provide wildlife with the essential elements required to live and thrive. The preservation of this system will ensure the continuance of the ecological balance of our Massachusetts shore.

V WATER RESOURCES EVALUATION

The Water Resources Commission is a water resources management and research agency involved in the needs, supplies, effects, uses and quality of water in the Commonwealth. The special concerns of the Commission are water

conservation, flood prevention, water quality, and the formulation of a water policy consistent with the varied requirements of consumers.

With respect to the Coastal Wetlands Act, the Commission is interested in minimizing losses due to floods in the coastal area and in classifying and working to protect the values of the water resources in the coastal areas. Flood control and water quality are important to all coastal communities, since they are in a position to feel the direct effects of any flooding or pollution, and in this regard will probably look to the state for assistance. Positive action can be taken before the fact though, and preventive measures can be initiated so that the ultimate cost to the community is minimized, both financially and environmentally.

Massachusetts' coastline is constantly pounded by waves which are often intensified by coastal storms. By their nature though, coastal wetlands can considerably reduce the impact. As a wave moves toward the shore, it first encounters the tidal flats where much of its energy is diffused. It continues its move shoreward and encounters a barrier beach which absorbs most of the remaining impact - although some of the energy leaks through, via the natural inlets, into the estuarine/marsh system.

Some degree of interaction also occurs between the coastal waters and the contiguous freshwater marshes lying inland from the salt marsh. These freshwater marshes act as a buffer, protecting the inland from coastal flooding and the estuarine/marsh area from adversely high levels of terrestrial runoff caused by spring thaws and inland storms.

Thus, abnormally high tides, storm surges, and heavy waves, along with runoff from inland areas, increase the chances of extensive flooding. One graphic example of this is the salt marshes in the town of Wareham where in the 1938 hurricane the water rose 15 feet above the surface of the marsh. Considering this, the coastal wetlands are not a logical site for

the construction of permanent structures, especially homes. Yet, to date, home construction is responsible for the greatest percentage of coastal wetland filling in Massachusetts.

Residences that are built along barrier beaches are extremely vulnerable to problems involving erosion, water supply, sewage disposal, and road and utility maintenance. Moreover, adequate levels of groundwater are essential to the preservation of this land form, for vegetation is necessary to stabilize the dunes that constitute the beach. (Stabilization of the dunes reduces wind-borne erosion.) When this type of area undergoes intensive development, the groundwater level will recede due to the change in runoff characteristics and utilization of the groundwater as a source of water supply. This in turn reduces the vegetation and accelerates the erosion process.

As a result of this development on barrier beaches it will be necessary for a community to install a municipal water supply and sewer system, as well as maintain them in an adverse location. In addition, the town would have to maintain roads through areas that are prone to flooding and erosion. The tax income realized from this development could very well be insufficient to pay for the necessary services and maintenance that the area requires.

Similar problems would also exist in the development of marsh areas. This land is extremely susceptible to flooding, so that the level of any filling would have to be raised to a line that would assure its protection. This would necessitate the removing of the peat-type material down to an adequate substrate and then filling to a level above any possible damage from a fifty or hundred-year storm. The cost of filling and stabilizing the area alone would be enough to raise the cost of such an undertaking beyond reasonable limits.

The natural resources of our coastal communities are well known throughout the country and attract numerous visitors every year. The heavy use of our beaches and estuaries add

much to the economy of the area. But if these activities are carried on without any regard to the ecological facts of life, then the quality of the resources will decline and with it the recreational-based economy. Water is among the most important of these resources and its quality must be maintained.

Tidal portions of the coastal waters of Massachusetts, as well as the estuaries, have been classified as SA waters. This is the highest classification available and means that these waters are suitable for any high-quality water use, including bathing, water-contact sports, and shellfishing. The inner land portion of these coastal waters — such as tidal marshes and creeks as well as contiguous freshwater creeks - is generally classified as B water quality. This is the highest classification for water that is used for recreational purposes. Irrefutably, all of us seek the same goal - which is to assure that the quality of these waters is maintained.

Coastal communities, especially those on Cape Cod, are also extremely reliant on the quality and extent of their other water resources. The water supply is tied to groundwater, limiting the development of the area to the availability of this supply. Overuse of this resource could necessitate changing the source of supply to some rather expensive alternative, such as importing water from outside the coastal area, recycling of effluents from sewage treatment plants, or the desalinization of sea water. Any rational planning and use of water resources in coastal areas should follow the fundamental guideline of precluding any development of wetlands so long as there is an adequate supply of undeveloped upland. Since the economic well-being of the region is directly linked to the environment, it is essential that the areas are utilized intelligently.

VI SUMMARY AND RECOMMENDATIONS

The purpose of this pamphlet and the Department's presentation at the formal hearing is to show you, the people

who will be affected by the Act, the value of the coastal wetlands and the necessity for their intelligent use. The Coastal Wetlands Protective Act was created to help assure the preservation of these areas and it has been quite successful towards this end.

The natural resources of a coastal area, whether they are the finfish or shellfish that abound in our coastal waters, or the wildlife and waterfowl, or the water that lies adjacent to or under the surface of our coastal land forms, or even the beauty of these areas themselves are all important to each and every one of you. They are important to the landowner because they add to the value of his property. They are important to the towns in general because they will benefit from the educated use of the lands. And finally, they are important to the economic well-being of the whole coastal region because the recreational-based economy will feel the direct effects of any large-scale nonreversible alteration of these resources. Intensive and concentrated usage of these resources may coexist only if people are educated in the environmental facts of life.

We ask that you not only accept the recommendations of this program, but also that each of you act within your community to work towards an expanded program of intelligent and educated use of our natural resources. With education will come awareness, then appreciation, and finally understanding.

SUGGESTED READING FOR ADDITIONAL INFORMATION

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